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New Methodical Approach to the VET Teachers' Training

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Abstract

Although the national VET systems differ in many aspects, the development of the new technologies and the spread of interactive and collaborative learning environment have brought about a general intention to launch action researches with innovation objectives. Our four-year project is aimed at the renewal of educational content and methods, and because it is strongly connected to schools, it is of empiric nature. The lecture describes the innovation processes relating to the content-methodological renewal of vocational teacher training. Since 2016, a network of 12 schools has been established in which teachers and students implement content development activities. This work aims to reduce the deficits in vocational learning materials as well as to modernize the slowly changing content. This model, which is aimed at serving this objective, necessarily requires a modern ICT-based infrastructure that helps online and collaborative learning.

Keywords

ICT; micro contents; open content development; teacher training; VET

1 Introduction

One field in the development of VET systems that bears serious development risks and possibilities all over the world is teacher training. In the last decade, the McKinsey report was an essential factor in recognizing the fact (Barber & Mourshed, 2007) that the future success and efficiency of educational systems was highly dependent on the teachers' quality and the effectiveness of their preparation. In VET, where educational content is permanently changing, and the learning environment has profoundly transformed during the latest years, the level of technical education very much depends on the teachers' methodological skills. Also, the renewal of the didactics applied in VET has become of exceptional importance during the latest years (Gessler & Herrera, 2015) mainly because owing to the online and interactive

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technologies (Beetham & Sharpe, 2013) the educational and learning environment has opened up many new opportunities (Mészáros, 2014).

In 2016, the Hungarian Academy of Sciences launched a four-year program that placed methodological modernization into the focus of subject pedagogical developments. One of the core features of our project is that in line with the nature of VET, stepping beyond the disciplinary frameworks and adjusting to the sectoral characteristics of VET and the structure of vocational teacher training, it aims to develop the methodological skills of the engineer-economist teachers in the online environment, with interactive techniques and collaborative processes (Benedek & Molnar, 2015). It is a specific, future-oriented challenge that the innovation model we wish to present in our lecture is being formed at a technical university environment that has a history of almost one and a half century in the field of vocational teachers' training.

2 History of OCD model

Our starting point is that the traditional curricular structures and the school books objectifying these for the pupils are somewhat limited in warranting the dynamics and the quality of the education of vocational subjects. Regarding the school books and handbooks, our surveys made it clear that the total deficit in learning materials is about 30 per cent while regarding quality, app. Forty-five per cent of the existing materials does not meet the requirement of being up-to-date. In the case of VET, this tendency could very clearly, and the challenge is growing tougher in the future. The essence of our model, which has been proved by our first development results, is that in the development of vocational educational content, the partnership that is much more open than traditional content development processes could establish between the teachers and the students. For all this, the online learning environment and interactive communication offer a favourable development environment where the partners' activeness and so their development attitudes can mutually be improved. Our procedure the target was at establishing a system in the process of the so-called open content development, from teacher training to the integration of VET teacher trainees at the schools, that comprehensively develops the teachers' (students-pupils') attitudes and their skills in adopting interactive, collaborative methodological techniques and also apply them in the school practice.

In a didactical sense, this model theoretically based on the classic student-teacher-content triangle. However, the development scope is much more complicated (Haege, 2015). Relying on the attitude surveys, we strived to develop the teachers' and the students' activity, as well, and to compose construction tasks similar to those in community-based content development. Micro contents that are connected to the creation of the learning results at the elementary level fulfilled essential functions as construction tasks. On the one hand, relating to the system of curricula, learning objectives and results in content development indicate a trend of collaborative creation in which activities may lead to concrete aims, results and successes (Ure, 2015). On the other hand, the role of images, that are permanently required in vocational didactics, as well, can be much more strongly asserted than in traditional processes. By applying the BYOND attitude, considerable student activity can be achieved, and at the same time, learning content can be developed in a differentiated way, deficiencies can be completed and the existing learning units updated.

The wider didactical environment of our model also offered the opportunity to integrate essential elements appearing as results in terms of the sustainability and the dissemination of the model. Thus, for example, new methodological modules were introduced and tested in the teachers' training and further training, the adoption of learning framework systems with VET objectives has become general, which has established up-to-date possibilities in the field of online collaborative learning, and the creation of cloud technologies intended to provide infrastructural support for content development and to help the wide range application of micro-

content (Benedek & Horváth, 2016) with an open-access attitude has also brought about promising results.

The lecture frames the general description of the model developed in the first half of the project. The theoretical background of our research is connected to the analyzations the frameworks of which were set by our research community at several fora (ECER VETNET, EDULEARN, INTED) along with our international activities aimed at renewing vocational didactics. Although the national VET systems differ in many aspects, the development of the new technologies and the spread of interactive and collaborative learning environment have brought about a general intention to launch action researches with innovation objectives. One of these initiations was the subject pedagogical research program prepared by the Hungarian Academy of Sciences between 2015 and 2017 that incorporated our project dealing with the development of VET methodology in 2016. The four-year project is aimed at the renewal of educational content and methods, and because it is strongly connected to schools, it is of empiric nature. Our research offers the possibility to launch concrete innovation processes connecting to the content-methodological renewal of vocational teacher training. Since 2016, a network of 12 schools has been established in which teachers and students implement content development activities. This work aims to reduce the deficits in vocational learning materials as well as to modernize the slowly changing content.

About the possibilities of local innovation, the methodological speciality of our project is the development of vocational micro-content and the creation of the connecting new pedagogical practice. The development is open for teachers and pupils, as well, therefore during the research, surveys examining the teachers' and students' attitudes have been made. We also analyse the new knowledge elements created during the modernization of the contents and also elaborate a series of methodological proposals that warrant the sustainability of the model.

This lecture primarily aims to describe the whole system relying on the first experiences in the operation of the OCD model, and so make the adoption available for a broader range of practice. One of the essential elements of our model is to implement strategic developments in the higher education phase of vocational teacher training. By doing so, we provide the possibility of learning the new methodology and the connecting techniques for the career starter vocational teachers. In the current phase of our project, we are establishing the infrastructural conditions (Sik, 2018) of the system connecting to content development, which will provide help for the teachers in the course of content development (creation of micro contents). Within the frames of the action research, we support collaboration between teachers in the pedagogical practice as well as the sharing and archiving of the new content in a network system by providing up-to-date cloud services.

3 Our Research Methods

The conceptional background of our research is connected to the analyzations the frameworks of which were set by our research community at several fora (ECER VETNET, EDULEARN, and INTED) along with our international activities aimed at renewing vocational didactics. The theoretical foundation is also supported by some international research projects (Opening Up Education), which is also crucial for Hungarian applied research (Pongrácz, 2017). Based on these, the authors can build action research on BYOD / BYOC approach.

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Based on the main trends and tendencies in the universe of industrial revolutions, the new developmental direction for technological innovations is called Industry 4.0.

The everyday use of new technologies (specifically ICT tools) is marked as digital literacy, which is already pervasive in our daily lives and our lifestyle. This influence is of great importance in the specialization phase of teacher education and training.

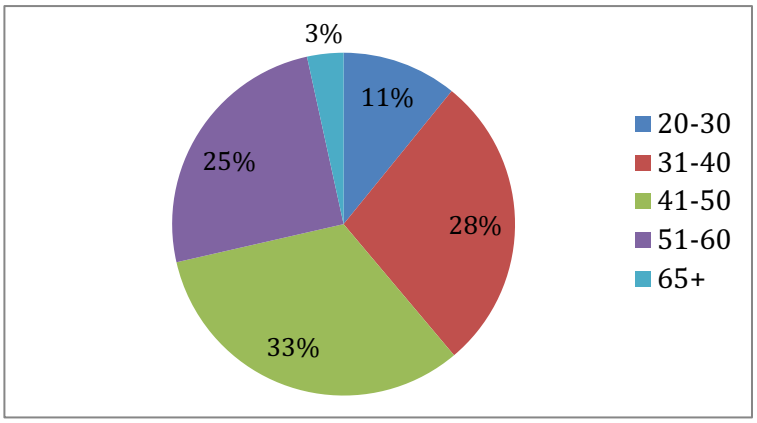
4 Empirical Survey

In this lecture, the author will address the role of ICT in vocational education, teacher training, and cloud-based and mobile learning methods. In addition to the theoretical considerations, the authors support the hypotheses through practice-oriented applications drawn from professional teacher training and empirical surveys and seek answers to open questions. The basis of the investigation is based on a simple stratified sampling method regarding a quantitative survey concluded in 2017, which reflects the results of a target group of N = 157 people. This lecture primarily aims to describe the whole system relying on the first experiences in the operation of the OCD model (Benedek & Molnár, 2017), and so make the adoption available for a broader range of practice. One of the essential elements of our model is to implement strategic developments in the higher education phase of vocational teacher training. By doing so, we provide the possibility of learning the new methodology and the connecting techniques for the career starter VET teachers. In the current phase of our project, we are establishing the infrastructural conditions of the system connecting to content development, which will provide help for the teachers in the course of content development (creation of micro contents). Within the frames of the action research, we support collaboration between teachers in the pedagogical practice as well as the sharing and archiving of the new content in a network system by providing modern cloud services.

The empirical test was in autumn 2017, a quantitative questionnaire based survey assessed the opinion of a sample of (N=177) instructors in vocational training institutions and students enrolled in vocational teacher training programs. In the case of the empirical test, we used on-line questionnaire forms, the tested multitude was chosen via simple layered sample taking the procedure, and the respective answers were processed and analysed with descriptive statistical methods. The size and wording of the questionnaires reflected the needs and demands of the given target group. Thus survey forms completed by instructors provided a more detailed and higher amount of information. Since the respective target groups are independent of each other and apart from a few exceptions they do not know each other, we can gain a comprehensive view of the current status of vocational training, and general conclusions can be drawn by the expansion of the sample. The aim of the testing process is to demonstrate the differences and similarities of the opinions of pedagogues and students, along with exploring the potential causes while integrating the respective information in the academic profile of our Department.

5 The results of the instructor survey

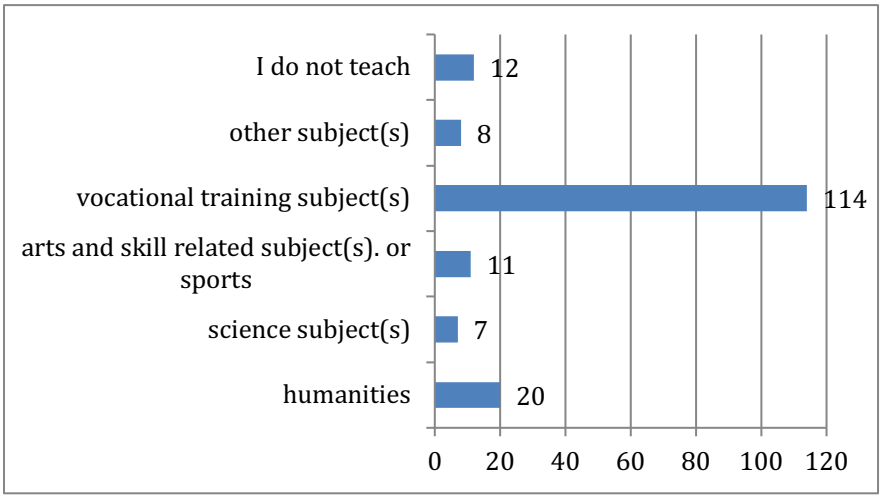
At first we provide a few pieces of characteristic and essential data gained from surveying the opinions of teachers. We present the given information in a graphic form, in diagrams. Figure 1 shows the age distribution of the respondents representing the X, Y, and Baby Boom generations.



Source: author's own compilation

Figure 1 The age distribution of the respondents

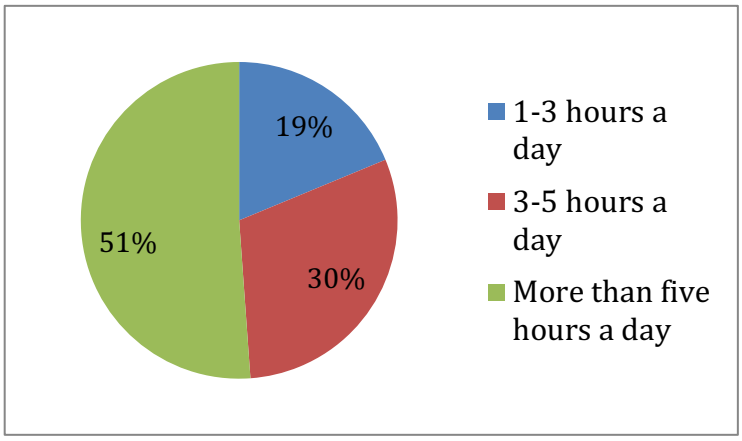
The next graph shows the distribution and variety of the subjects instructed. Accordingly, the figure proves that 64,4% of the respondents teach professional or vocational training related subjects, as most of them work as vocational instructors.



Source: author's own compilation.

Figure 2 The distribution and variety of subjects taught by the respondents

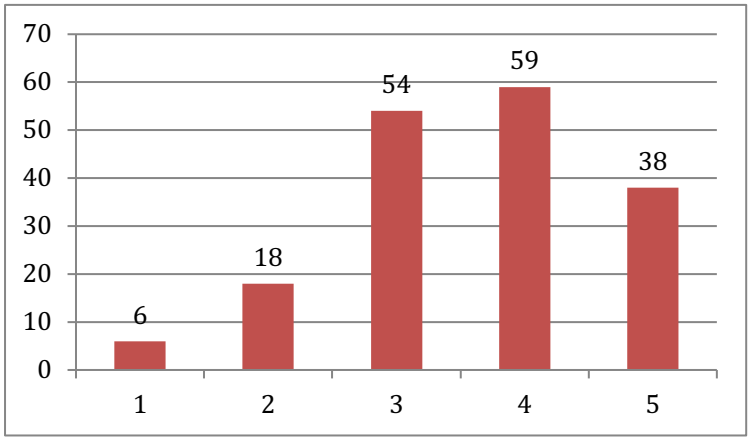
The figure below illustrates the amount of time people use computers during an average work day. Accordingly, 51% of the respondents use computers more than 5 hours a day while approximately 1/3 of the sample work with computers between 3 and 5 hours a day. Such findings prove that the respondents' digital culture is dominated by computers.



Source: author's own compilation

Figure 3 The distribution and variety of computer use among the respondents

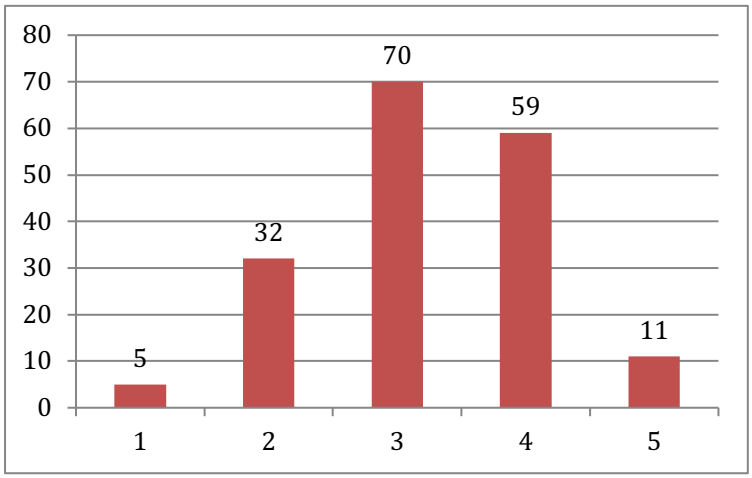
Figure 4 illustrates the extent of ICT device use in the education process with the value of 5 representing the use of such technology in every class. It can be concluded that ¾ of the respondents use ICT devices virtually on a daily basis.



Source: author's own compilation

Figure 4 The distribution and variety of the extent of the respondents' computer use

The last figure represents the availability of ICT devices in the respective institutions with a value of 5 representing full availability. Accordingly, the ICT accessibility at the institutions surveyed is at average or medium level.



Source: author's own compilation

Figure 5 The distribution and variety of the accessibility of ICT devices at the schools of the sample

6 Conclusions

According to the activities done during the preparation year (2015) and the currently running project (2016-2020), the first results of our researches can be summarized as follows:

- we have established the theoretical background that gives the basis for our three-level model the internal structure of which is as follows:
- the VET didactical analyzation of the micro-content connected to the learning results at the elementary level
- initiation of methodological innovation in vocational teacher training and the further education of teachers working in VET
- establishment of a pilot school-network (12 schools) I which we examine the impacts and the results of the innovation
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The starting point of our VET didactical principles is that less and less fixed and stable learning materials are available in VET. Therefore a new type of partnership must be created in content development that allows the teachers' and students' active participation. The OCD model, which is aimed at serving this objective, necessarily requires a modern ICT-based infrastructure that helps online and collaborative learning. The process, that has already been introduced and tested in school practice, shapes the teachers' content development culture at the micro level. The development of micro-content allows cooperation while the size of the task and the time demanded by the applied process can be adjusted to the teachers' everyday activities. An essential condition of this method, which focuses on a training field wider than the traditional disciplinary - subject based view, is that the teachers get targeted preparation to use it. The essential phase of this is teacher training. However, the teachers' further training is also of great importance as well as the local support of developments.

A new element of the OCD model is that it is open to the students' activities, which allows a unique type of cooperation between teachers and students. The most significant added pedagogical value of this, which is also perceivable in practice, is the increase in the students' activity.

The development program initiated at pilot schools is currently stepping towards general practice. So far, our measurements have strived to determine the attitude levels of the teachers and the students. Since the micro contents elaborated by the teachers and the students can be considered essential results of the development, their evaluation and the analysation of their content and genre may reveal new possibilities of VET educational content development. In the next phase of our research, we will primarily focus on the analyzation of these impacts and the operational results of the OCD model.

References

Barber, M., & Mourshed, M. (2007). *How the world's best-performing school systems come out on top*. McKinsey and Co.

Beetham, H., & Sharpe, R. (Eds.). (2013). *Rethinking pedagogy for a digital age: Designing for 21st century learning* (2nd ed.). Abingdon: Routledge. Retreieved from http://www.dtransform.eu/

Benedek, A., & Horváth C. J. (2016). New methods in the digital learning environment: micro contents and visual case studies. In A. Moreira Teixeira, A. Szűcs, & I. Mázár (Eds.), *Re-imaging learning environments: Proceedings of the european distance and E-learning network 2016 annual conference* (pp. 27–34). Budapest: European Distance and E-Learning Network (EDEN).

Benedek, A., & Molnár, G. (2015). New approaches to the E-content and E-textbook in higher education. In L. Gómez Chova, A. López Martínez, & I. Candel Torres (Eds.), *INTED2015 Proceedings: 9th International Technology, Education and Development Conference.* (pp. 3646–3650). Madrid, Spain: International Academy of Technology, Education and Development (IATED).

Benedek, A., & Molnár G. (2017). Open content development in ICT environment. In L. Gómez Chova, A. López Martínez, & I. Candel Torres (Eds.), *INTED2017 Proceedings: 11th International Technology, Education and Development Conference* (pp. 1883–1891). Valencia: International Association of Technology, Education and Development (IATED).

Gessler, M., & Herrera, M. L. (Eds.). (2015). Special edition: Vocational didactics. *International Journal for Research in Vocational Education and Training (IJRVET), 3*(2).

Hæge, N. (2015). Re-contextualizing vocational didactics in Norwegian vocational education and training. *International Journal for Research in Vocational Education and Training (IJRVET), 3*(2), 182–194.

Mészáros, A. (2014). Examples of the realization of the Hungarian higher education human resource development. In S. Brdarevic & S. Jasarevic (Eds.), *The 3rd conference Odrzavanje – Maintenance* (pp. 269–276). Zenica, Bosznia-Hercegovina: University of Zenica Faculty of Mechanical Engineering.

Pongrácz, A. (2017). Der Arbeitsmarkt und die berufliche Bildung in der Automobilindustrie in Ungarn heute. *EDU Szakképzés és környzetpedagógiai elektronikus szakfolyóirat, 7*(1), 7–26.

Sik, D. (2018). Introduction and implementation of a multi-leveled E-learning environment based on the open content development model principles advances. *Intelligent Systems and Computing, 716*(2), 64–70.

Ure, O.J. (2015). Governance for learning outcomes in European policy making: Qualification frameworks pushed through the open method of coordination. *International Journal for Research in Vocational Education and Training (IJRVET), 4(*2), 268–283.

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